

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416																									
International application No.	International filing date ( <i>day/month/year</i> )	Priority date ( <i>day/month/year</i> )																								
International Patent Classification (IPC) or national classification and IPC																										
Applicant																										
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>8</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>			<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input checked="" type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand	Date of completion of this report																									
Name and mailing address of the IPEA/	Authorized officer																									
Facsimile No.	Telephone No.																									

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KZ2004/000002

Box No. I

Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages \_\_\_\_\_ as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ the drawings:
- sheets \_\_\_\_\_ as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	1-48	YES
	Claims		NO
Inventive step (IS)	Claims	1-48	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-48	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

Reference is made to the following documents cited in the search report:

D1: DE 195097 A1  
D2: US 6341583 B1  
D3: RU 2018007 C1  
D4: RU 2133847 C1

A piston mechanism is known from D1, D2, D3 or D4 with diverging pistons, consisting of a crank chamber with a crankshaft, a cylinder with inlet apertures, at least two oppositely directed pistons, connecting elements, and spark plugs in working chambers formed between pistons or by one outer piston.

Connecting elements interacting with three crankpins of a crankshaft, one of said elements being connected with the centre crankpin and another with the two outer crankpins, is also known from D1 and D2. Furthermore, at least one piston is rigidly fixed on rods which are fixed by their bases on one of the connecting elements, and located in guiding channels provided in the cylinder housing parallel to the axis thereof, with a synchronous group of rods being formed whose movement is in a direction

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

corresponding to this connecting element (D1).

The connecting elements can be positioned between the shaft and the piston closest thereto; the inner connecting element is connected with the central crankpin of the shaft, and the outer connecting element with the end crankpins (D1, D2).

Crank-type and hinged frames and sliding members are known from D3 or D4.

However, the features of the connecting elements, rods, guiding channels, sliding members, frames, their relationships and relative arrangement, and the formation of synchronous groups are described in detail in the set of claims.

Comparison with D1-D4 shows that the claimed invention differs from the prior art in additionally comprising rods which are rigidly connected with at least one oppositely directed piston and another connecting element, and are located in additional guiding channels, parallel to already existing channels and alternating therewith. Furthermore, all the channels are made with slits in the working surface of the cylinder with outlets into the cavity thereof, in such a way that the side faces of rods of differently directed synchronous groups, turned towards the cylinder cavity, form mobile sections of the working surface thereof. Furthermore, the pistons are alternately fastened along their perimeters on the side faces of rods of different synchronous groups, with formation of working chambers therebetween.

The proposed invention produces a piston

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mechanism whose metal content is small, which is effective, operates reliably, is simple to produce and is of high specification. It enables a greater power-weight ratio to be achieved and different strokes of independent working cycles to be performed simultaneously.

The claimed invention characterised in independent claim 1 and dependent claims 2-48 is novel, and meets the requirements of inventive step and industrial applicability.

## Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

The following defects have been noted in the international application:

There are several comments on the claims and the description of the invention.

Claim 1 indicates that a working chamber is formed between pistons, whereas claims 42 and 43 indicate that a working chamber is formed by one piston. There is a contradiction between the independent and dependent claims in the form submitted, as replacement or removal of features of the independent claim is presupposed.

In the expert's opinion, an acceptable solution could be to use the word "additional" in claims 42, 43 in relation to chamber 45, formed by the end piston and lid 44 of cylinder 1, that is to refer to chamber 45 as in the description.

Furthermore, to express the direct dependence of a dependent claim on a plurality of claims (multiple dependence), the reference thereto shall use the alternative, this concerns namely claims 10, 20, 21, 22, 29 and 32.

Moreover, a multiple dependent claim shall not serve as a basis for any other multiple dependent claims. (This concerns claims 11, 12 and 13).

The term "developed" in claim 22 is dubious, as it is difficult to understand what it means. However, the subsequent words ("...with an increased surface...") describe the specific embodiment of the relevant projection quite adequately.

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Box No. VII

Certain defects in the international application

The term "shortened" applied to the pistons and rods in claims 31 and 34 is vague, as it is unclear by how much they are shorter, and with what they are being compared.

As it is not mentioned in claim 1 that the rods have faces, and a plurality of the faces are wide, the examiner considers that it would be more logical to begin claim 23 precisely by indicating the presence of wide faces.

The term "housing" (of the cylinder) does not appear in the List of items. It is not mentioned in claims 18, 19, 33, 45, 47 and 48 either, while the description states that it is the cylinder (rather than the housing thereof) which has lids 2, 44.

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**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: